

We claim:

1. A golf ball including a composition comprising:  
an unsaturated polymer;  
a cross-linking agent; and  
a peptizer;  
5        wherein the composition includes less than about 0.45 part by weight of the cross-linking agent per 100 parts by weight of the unsaturated polymer.
2. The golf ball according to claim 1, wherein the composition includes less than about 0.4 part by weight of the cross-linking agent per 100 parts by weight of the unsaturated polymer.
3. The golf ball according to claim 1, wherein the composition includes less than about 0.35 part by weight of the cross-linking agent per 100 parts by weight of the unsaturated polymer.
4. The golf ball according to claim 1, wherein the composition includes greater than about 0.1 part by weight of the peptizer per 100 parts by weight of the unsaturated polymer.
5. The golf ball according to claim 1, wherein the composition includes greater than about 0.2 part by weight of the peptizer per 100 parts by weight of the unsaturated polymer.
6. The golf ball according to claim 1, wherein the composition includes greater than about 0.5 part by weight of the peptizer per 100 parts by weight of the unsaturated polymer.
7. The golf ball according to claim 1, wherein the peptizer is selected from the group consisting of pentachlorothiophenol, a metal salt of pentachlorothiophenol, a non-metal salt of pentachlorothiophenol, and dibenzamido dipenyldisulfide.
8. The golf ball according to claim 1, wherein the peptizer is selected from the group consisting of an amine salt of pentachlorothiophenol and an ammonium salt of pentachlorothiophenol.

9. The golf ball according to claim 1, wherein the composition further comprises an accelerator.

10. The golf ball according to claim 9, wherein the composition includes from about 0.1 part to about 10 parts by weight of the accelerator per 100 parts by weight of the unsaturated polymer.

11. The golf ball according to claim 9, wherein the composition includes from about 0.2 part to about 5 parts by weight of the accelerator per 100 parts by weight of the unsaturated polymer.

12. The golf ball according to claim 9, wherein the composition includes from about 0.5 part to about 1.5 parts by weight of the accelerator per 100 parts by weight of the unsaturated polymer.

13. The golf ball according to claim 9, wherein the accelerator is selected from the group consisting of 2-mercaptobenzothiazole and a salt of 2-mercaptobenzothiazole.

14. The golf ball according to claim 1, wherein the unsaturated polymer is selected from the group consisting of 1,2-polybutadiene, cis-1,4-polybutadiene, trans-1,4-polybutadiene, cis-polyisoprene, trans-polyisoprene, polychloroprene, polybutylene, styrene-butadiene rubber, block copolymer of styrene and butadiene, block copolymer of styrene and  
5 isoprene, nitrile rubber, silicone rubber, polyurethane, and mixtures thereof.

15. The golf ball according to claim 1, wherein the composition further comprises an ingredient selected from the group consisting of UV stabilizers, photo stabilizers, antioxidants, colorants, dispersants, mold releasing agents, processing aids, and fillers.

16. The golf ball according to claim 15, wherein the ingredient is a filler that adjusts a density of the composition.

17. The golf ball according to claim 15, wherein the ingredient is a filler selected from the group consisting of zinc oxide, tungsten, and barium sulfate.

18. The golf ball according to claim 15, wherein the ingredient is a filler and the composition includes from about 10 parts to about 80 parts by weight of the filler per 100 parts by weight of the unsaturated polymer.

19. The golf ball according to claim 1, wherein the composition further comprises a compound selected from the group consisting of an unsaturated carboxylic acid, a metal salt of the unsaturated carboxylic acid, and mixtures thereof.

20. The golf ball according to claim 19, wherein the composition includes from about 20 parts to about 60 parts by weight of the compound per 100 parts by weight of the unsaturated polymer.

21. The golf ball according to claim 1, further comprising:  
a core; and  
a cover layer over the core;  
wherein at least one of the core and the cover layer includes the composition.

22. The golf ball according to claim 21, wherein the core includes:  
an inner core; and  
an outer core encasing the inner core.

23. The golf ball according to claim 21, wherein the core includes a material in liquid form.

24. The golf ball according to claim 21, further comprising a layer of rubber thread located between the core and the cover layer.

25. The golf ball according to claim 1, further comprising:  
a core;  
at least one intermediate layer over the core; and  
a cover layer over the outermost intermediate layer;  
5 wherein at least one of the core, the at least one intermediate layer, and the cover layer includes the composition.

26. A golf ball including a composition comprising:

an unsaturated polymer;  
a cross-linking agent; and  
a peptizer;

5 wherein:

the peptizer is selected from the group consisting of an amine salt  
of pentachlorothiophenol and an ammonium salt of pentachlorothiophenol,  
the composition includes less than about 0.45 part by weight of the  
cross-linking agent per 100 parts by weight of the unsaturated polymer, and  
10 the composition includes from about 0.1 part to about 5 parts by  
weight of the peptizer per 100 parts by weight of the unsaturated polymer.

27. The golf ball according to claim 26, wherein the composition includes less  
than about 0.4 part by weight of the cross-linking agent per 100 parts by weight of the  
unsaturated polymer.

28. The golf ball according to claim 26, wherein the composition includes less  
than about 0.35 part by weight of the cross-linking agent per 100 parts by weight of the  
unsaturated polymer.

29. The golf ball according to claim 26, wherein the peptizer is selected from the  
group consisting of pentachlorothiophenol, a metal salt of pentachlorothiophenol, a non-metal  
salt of pentachlorothiophenol, and dibenzamido diphenyldisulfide.

30. The golf ball according to claim 26, wherein the peptizer is selected from the  
group consisting of an amine salt of pentachlorothiophenol and an ammonium salt of  
pentachlorothiophenol.

31. The golf ball according to claim 26, further comprising an accelerator  
selected from the group consisting of 2-mercaptobenzothiazole and a salt of 2-  
mercaptobenzothiazole.

32. The golf ball according to claim 26, wherein the unsaturated polymer is  
selected from the group consisting of 1,2-polybutadiene, cis-1,4-polybutadiene, trans-1,4-  
polybutadiene, cis-polyisoprene, trans-polyisoprene, polychloroprene, polybutylene, styrene-

butadiene rubber, block copolymer of styrene and butadiene, block copolymer of styrene and  
5 isoprene, nitrile rubber, silicone rubber, polyurethane, and mixtures thereof.

33. The golf ball according to claim 26, wherein the composition further comprises an ingredient selected from the group consisting of UV stabilizers, photo stabilizers, antioxidants, colorants, dispersants, mold releasing agents, processing aids, and fillers.

34. The golf ball according to claim 33, wherein the ingredient is a filler that adjusts a density of the composition.

35. The golf ball according to claim 33, wherein the ingredient is a filler selected from the group consisting of zinc oxide, tungsten, and barium sulfate.

36. The golf ball according to claim 33, wherein the ingredient is a filler and the composition includes from about 10 parts to about 80 parts by weight of the filler per 100 parts by weight of the unsaturated polymer.

37. The golf ball according to claim 26, wherein the composition further comprises a compound selected from the group consisting of an unsaturated carboxylic acid, a metal salt of the unsaturated carboxylic acid, and mixtures thereof.

38. The golf ball according to claim 37, wherein the composition includes from about 20 parts to about 60 parts by weight of the compound per 100 parts by weight of the unsaturated polymer.

39. The golf ball according to claim 26, further comprising:  
a core; and  
a cover layer over the core;  
wherein at least one of the core and the cover layer includes the composition.

40. The golf ball according to claim 39, wherein the core includes:  
an inner core; and  
an outer core encasing the inner core.

41. The golf ball according to claim 39, wherein the core includes a material in liquid form.

42. The golf ball according to claim 39, further comprising a layer of rubber thread located between the core and the cover layer.

43. The golf ball according to claim 26, further comprising:  
a core;  
at least one intermediate layer over the core; and  
a cover layer over the outermost intermediate layer;  
5 wherein at least one of the core, the at least one intermediate layer, and the cover layer includes the composition.

44. A method for manufacturing a golf ball, the method comprising:  
providing:  
an unsaturated polymer,  
a cross-linking agent, and  
5 a peptizer;  
preparing a composition from the unsaturated polymer, the cross-linking agent, and the peptizer, wherein the composition includes less than about 0.45 part by weight of the cross-linking agent per 100 parts by weight of the unsaturated polymer; and  
forming the composition into the golf ball.

45. The method according to claim 44, further comprising compression molding the composition to induce cross-linking of the unsaturated polymer.

46. The method according to claim 44, further comprising applying thermal energy to the composition to induce cross-linking.

47. The method according to claim 44, wherein the composition is formed into half shells.

48. The method according to claim 47, further comprising compression molding the half shells.

49. The method according to claim 44, wherein the step of preparing the composition includes dry-blending the composition using equipment selected from the group consisting of a tumble mixer, a V-blender, a ribbon blender, and a two-roll mill.

50. The method according to claim 44, wherein the step of preparing the composition includes mixing the composition using equipment selected from the group consisting of a mill, an internal mixer, an extruder, and combinations thereof.